भारतीय मानक

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(*दूसरा पुनरीक्षण*)

Indian Standard

INTERNAL COMBUSTION ENGINE — SEALING WASHERS FOR PIPE UNIONS — SPECIFICATION

(*Second Revision*)

ICS 23.040.80; 43.060.99

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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Automotive Prime Movers, Transmission, Steering Systems and Internal Combustion Engines Sectional Committee, TED 2

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Prime Movers, Transmission, Steering Systems and Internal Combustion Engines Sectional Committee had been approved by the Transport Engineering Division Council.

This standard was originally published in 1965 and revised in 1974. This revision has been taken up to update the standard based on latest technology and the experience gained in its implementation. In this revision clause on material and sampling has been modified according to the latest available standards.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

INTERNAL COMBUSTION ENGINE — SEALING WASHERS FOR PIPE UNIONS — SPECIFICATION

(Second Revision)

1 SCOPE

This standard specifies the dimensions and other requirements of sealing washers for pipe unions.

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standard indicated below:

IS No.	*Title*
191 : 2007	Copper (*fourth revision*)
737 : 1986	Wrought aluminium and aluminium alloy sheet and strip for general engineering purposes (*third revision*)
1367 (Part 17) : 2005	Industrial fasteners — Threaded steel fasteners — Technical supply conditions: Part 17 Inspection, sampling and acceptance procedure (*fourth revision*)
2643 : 2005	Pipe threads where pressure-tight joints are not made on the threads — Dimensions, tolerances and designation (*third revision*)
4218	ISO general purpose metric screw threads:
(Part 1) : 2001	Basic profile (*second revision*)
(Part 2) : 2001	General plan (*second revision*)
(Part 3) : 1999	Basic dimensions (*second revision*)
(Part 4) : 2001	Selected sizes for screws, bolts and nuts (*second revision*)

3 DIMENSIONS AND TOLERANCES

Dimensions and tolerances for sealing washer shall be according to Table 1.

4 MATERIAL

4.1 Copper of minimum purity 99.5 percent conforming to IS 191 or aluminium grade 19000 H2 conforming to IS 737.

4.2 Cold rolled copper having the following physical properties shall be used:

a) *Tensile Strength* — 200 to 250 N/mm^2 (20 to 25 kgf/ mm^2);
b) *Elongation* — 40 percent, *Min*; and
c) Annealing to a hardness of 45 HB, *Max*.

5 WORKMANSHIP AND FINISH

Well formed and free from burrs.

6 DESIGNATION

It shall include,

a) commonly used name;
b) normal size;
c) number of this standard; and
d) material, whether copper (Cu) or aluminium (Al).

Example:

A sealing washer of nominal size 10 × 15 made of copper shall be designated as:

Sealing Washer 10 × 15 IS 3175 Cu

7 SAMPLING AND CRITERIA FOR CONFORMITY

Unless otherwise agreed to between the manufacturer and the purchaser, the sampling scheme and criteria for conformity with this standard shall be as laid down in IS 1367 (Part 17).

8 MARKING

The package shall be marked legibly and indelibly with the designation and manufacturer's name or trade-mark.

8.1 BIS Certification Marking

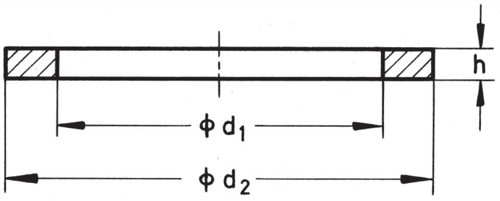
The package may also be marked with the Standard Mark.

8.1.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Table 1 Dimensions and Tolerances for Sealing Washer

(*Clause* 3)

All dimensions in millimetres.



Nominal Size[1]	***d*₁**	***d*₂**	***h***	**Used for**	
				Metric Threads According to IS 4218 (Parts 1 to 4)	Pipe Threads According to IS 2643
(1)	(2)	(3)	(4)	(5)	(6)
3.5 × 6	3.7 + 0.3	5.9 – 0.2	1 ± 0.2	—	—
4 × 8	4.2 + 0.3	7.9 – 0.2			
5 × 7.5	5.2 + 0.3	7.4 – 0.2			
(5 × 9)	5.2 + 0.3	8.9 – 0.2			
5.5 × 8	5.7 + 0.3	7.9 – 0.2			
(6 × 10)	6.2 + 0.3	9.9 – 0.2			
6.5 × 9.5	6.7 + 0.3	9.4 – 0.2			
(6.5 × 11)	6.7 + 0.3	10.9 – 0.2			
8 × 11.5	8.2 + 0.3	11.4 – 0.2	1 ± 0.2	M8 × 1	—
8 × 12	8.2 + 0.3	11.9 – 0.2			
(8 × 13)	8.2 + 0.3	12.9 – 0.2			
(8 × 14)[2]	8.2 + 0.3	13.9 – 0.2			
10 × 13.5	10.2 + 0.3	13.4 – 0.2	1 ± 0.2	M10 × 1	FP 1/8
10 × 14[2]	10.2 + 0.3	13.9 – 0.2			
(10 × 15)	10.2 + 0.3	14.9 – 0.2			
(10 × 16)[2]	10.2 + 0.3	15.9 – 0.2			
12 × 15.5	12.2 + 0.3	15.4 – 0.2	1.5 ± 0.2	M12 × 1.5	—
12 × 16[2]	12.2 + 0.3	15.9 – 0.2			
(12 × 17)	12.2 + 0.3	16.9 – 0.2			
(12 × 18)[2]	12.2 + 0.3	17.9 – 0.2			
14 × 18	14.2 + 0.3	17.9 – 0.2	1.5 ± 0.2	M14 × 1.5	FP 1/4
(14 × 20)	14.2 + 0.3	19.9 – 0.2			
15 × 19	15.2 + 0.3	18.9 – 0.2	1.5 ± 0.2	—	—
16 × 20	16.2 + 0.3	19.9 – 0.2	1.5 ± 0.2	M16 × 1.5	—
(16 × 22)	16.2 + 0.3	21.9 – 0.2			
17 × 21	17.2 + 0.3	20.9 – 0.2	1.5 ± 0.2	—	FP 3/8
(17 × 23)	17.2 + 0.3	22.9 – 0.2			
18 × 22	18.2 + 0.3	21.9 – 0.2	1.5 ± 0.2	M18 × 1.5	—
(18 × 24)	18.2 + 0.3	23.9 – 0.2			
20 × 24	20.2 + 0.3	23.9 – 0.2	1.5 ± 0.2	M20 × 1.5	—
(20 × 26)	20.2 + 0.3	25.9 – 0.2			
21 × 26	21.2 + 0.3	25.9 – 0.2	1.5 ± 0.2	—	FP 1/2
(21 × 28)	21.2 + 0.3	27.9 – 0.2			
22 × 27	22.2 + 0.3	26.9 – 0.2	1.5 ± 0.2	M22 × 1.5	—
(22 × 29)	22.2 + 0.3	28.9 – 0.2			
23 × 28	23.3 + 0.3	27.9 – 0.2	2 ± 0.2	—	FP 5/8
(23 × 30)	23.3 + 0.3	29.9 – 0.2			
24 × 29	24.3 + 0.3	28.9 – 0.2	2 ± 0.2	M24 × 1.5	—
(24 × 32)	24.3 + 0.3	31.9 – 0.2			
25 × 30	25.3 + 0.3	29.9 – 0.2	2 ± 0.2	—	—
(25 × 33)	25.3 + 0.3	32.9 – 0.2			
26 × 31	26.3 + 0.3	30.9 – 0.2	2 ± 0.2	M26 × 1.5	—
(26 × 32)	26.3 + 0.3	31.9 – 0.2			
(26 × 34)	26.3 + 0.3	33.9 – 0.2			
27 × 32	27.3 + 0.3	31.9 – 0.2	2 ± 0.2	M27 × 2	FP 3/4
(27 × 35)	27.3 + 0.3	34.9 – 0.2			
28 × 33	28.3 + 0.3	32.9 – 0.2	2 ± 0.2	—	—
30 × 36	30.3 + 0.3	35.9 – 0.2	2 ± 0.2	M30 × 1.5 M30 × 2	FP 7/8
(30 × 38)	30.3 + 0.3	37.9 – 0.2			
32 × 38	32.3 + 0.3	37.9 – 0.2	2 ± 0.2	—	—
(32 × 40)	32.3 + 0.3	39.9 – 0.2			

Table 1 (*Concluded*)

Nominal Size1) (1)	***d*₁** (2)	***d*₂** (3)	***h*** (4)	**Used for** Metric Threads According to IS 4218 (Parts 1 to 4) (5)	**Used for** Pipe Threads According to IS 2643 (6)
33 × 39	33.3 + 0.3	38.9 – 0.2	2 ± 0.2	M33 × 2	FP 1
(33 × 41)	33.3 + 0.3	40.9 – 0.2			
35 × 41	35.3 + 0.3	40.9 – 0.2	2 ± 0.2	—	—
36 × 42	36.3 + 0.3	41.9 – 0.2	2 ± 0.2	M36 × 1.5	—
(36 × 44)	36.3 + 0.3	43.9 – 0.2		M36 × 2	
38 × 44	38.3 + 0.3	43.9 – 0.2	2 ± 0.2	M38 × 1.5	FP 1-7/8
(38 × 46)	38.3 + 0.3	45.9 – 0.2			
39 × 46	39.3 + 0.3	45.9 – 0.2	2 ± 0.2	M39 × 2	—
(39 × 48)	39.3 + 0.3	47.9 – 0.2			
36 × 42	36.3 + 0.3	41.9 – 0.2	2 ± 0.2	M36 × 1.5	—
(36 × 44)	36.3 + 0.3	43.9 – 0.2		M36 × 2	
38 × 44	38.3 + 0.3	43.9 – 0.2	2 ± 0.2	M38 × 1.5	FP 1-7/8
(38 × 46)	38.3 + 0.3	45.9 – 0.2			
39 × 46	39.3 + 0.3	45.9 – 0.2	2 ± 0.2	M39 × 2	—
(39 × 48)	39.3 + 0.3	47.9 – 0.2			
36 × 42	36.3 + 0.3	41.9 – 0.2	2 ± 0.2	M36 × 1.5	—
(36 × 44)	36.3 + 0.3	43.9 – 0.2		M36 × 2	
38 × 44	38.3 + 0.3	43.9 – 0.2	2 ± 0.2	M38 × 1.5	FP 1-7/8
(38 × 46)	38.3 + 0.3	45.9 – 0.2			
39 × 46	39.3 + 0.3	45.9 – 0.2	2 ± 0.2	M39 × 2	—
(39 × 48)	39.3 + 0.3	47.9 – 0.2			
40 × 47	40.3 + 0.3	46.9 – 0.2	2 ± 0.2	—	—
(40 × 49)	40.3 + 0.3	48.9 – 0.2			
42 × 49	42.3 + 0.3	48.9 – 0.2	2 ± 0.2	M42 × 1.5	FP 1-1/4
(42 × 51)	42.3 + 0.3	50.9 – 0.2		M42 × 2	
44 × 51	44.3 + 0.3	50.9 – 0.2	2 ± 0.2	—	—
(44 × 53)	44.3 + 0.3	52.9 – 0.2			
45 × 52	45.3 + 0.3	51.9 – 0.2	2 ± 0.2	M45 × 1.5	—
(45 × 54)	45.3 + 0.3	53.9 – 0.2		M45 × 2	
48 × 55	48.3 + 0.3	54.9 – 0.2	2 ± 0.2	M48 × 1.5	FP 1-1/3
(48 × 57)	48.3 + 0.3	56.9 – 0.2		M48 × 2	
50 × 57	50.3 + 0.3	56.9 – 0.2	2 ± 0.2	—	—
(50 × 59)	50.3 + 0.3	58.9 – 0.2			
52 × 60	52.5 + 0.5	59.8 – 0.3	2.5 ± 0.2	M52 × 1.5	—
(52 × 62)	52.5 + 0.5	61.8 – 0.3		M52 × 2	
54 × 62	54.5 + 0.5	61.8 – 0.3	2.5 ± 0.2	—	FP 1-3/4
(54 × 64)	54.5 + 0.5	63.8 – 0.3			
55 × 63	55.5 + 0.5	62.8 – 0.3	2.5 ± 0.2	—	—
56 × 64	56.5 + 0.5	63.8 – 0.3	2.5 ± 0.2	M56 × 2	—
58 × 66	58.5 + 0.5	65.8 – 0.3	2.5 ± 0.2	—	—
60 × 68	60.5 + 0.5	67.8 – 0.3	2.5 ± 0.2	M60 × 2	FP 2
64 × 72	64.5 + 0.5	71.8 – 0.3	2.5 ± 0.2	M64 × 2	—
65 × 74	65.5 + 0.5	73.8 – 0.3	2.5 ± 0.2	M65 × 2	—
70 × 79	70.5 + 0.5	78.8 – 0.3	2.5 ± 0.2	—	—
75 × 84	75.5 + 0.5	83.8 – 0.3	2.5 ± 0.2	—	—
78 × 88	78.5 + 0.5	87.8 – 0.3	2.5 ± 0.2	M78 × 2	—
80 × 90	80.7 + 0.5	89.8 – 0.3	2.5 ± 0.2	—	—
85 × 95	85.7 + 0.5	94.8 – 0.3			
90 × 100	90.7 + 0.5	99.8 – 0.3			
95 × 105	95.7 + 0.5	104.8 – 0.3			
100 × 110	100.7 + 0.5	109.8 – 0.3			
105 × 115	105.7 + 0.5	114.8 – 0.3			
110 × 120	110.7 + 0.5	119.8 – 0.3			
115 × 125	115.7 + 0.5	124.8 – 0.3			
120 × 130	120.7 + 0.5	129.8 – 0.3			
125 × 135	125.7 + 0.5	134.8 – 0.3			

NOTES

1 Sizes given in parentheses are non-preferred.

2 The empty spaces in the column 'Used for Threads' indicate that no threads are assigned for these nominal sizes.

3 Nominal sizes up to 18 × 24 are used for fuel injection equipment.

1) Nominal size is approximate inside diameter and suitably rounded off outside diameter.

2) These sizes are not applicable for new designs.

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